Minebea

TORQUE TRANSDUCER CALIBRATION SOFTWARE TMHSAD-01

Instruction Manual

EN294-1799

Introduction

Thank you for purchasing our TMHSA series Torque Transducer.

This instruction manual describes how to operate the device, as well as noteworthy points. Note that handling or operating the device incorrectly may result in malfunctions. Read this manual thoroughly before use for safety and optimal results.

Keep this instruction manual in a location where it is readily accessible to end users.

Please note that this instruction manual is intended for use by engineers.

Disclaimers

- The details contained in this instruction manual are subject to change without notice due to product improvements.
- While every care has been taken in the preparation of this instruction manual, it may not be possible to correct errors or omissions immediately.
- This instruction manual is copyrighted by our company. It may not be reproduced in part or in whole without our express permission.

Scope of Software License

“The software” refers to the TMHSAD-01 software and its accompanying documentation, including the instruction manual.

- A copy may not be retained if all of the rights of the software are transferred. Any transfer of the software (including all component parts, media, and documentation) shall be under the condition of agreement by the recipient to the scope of the license.
- The software may not be rented, leased, copied, modified, adapted, reverse-engineered, reverse-compiled, or reverse-assembled in part or in its entirety.
  Likewise, such actions may not be performed by third parties.

Pictograms and Conventions Used in This Manual

This manual uses the following pictograms to indicate actions to avoid at all times, aspects requiring caution, and other noteworthy matters.

Be sure to read the descriptions provided alongside these pictograms.

Warning

This indicates circumstances in which incorrect handling may result in death or serious injury to users.
Avoid the actions described here at all times.

Caution

This indicates circumstances in which incorrect handling may result in injury to users or damage to property.

This indicates operating or procedural precautions or restrictions.
Always read the details included here to avoid malfunctioning.

Safety Precautions

Please be sure to read this manual before attempting to use the equipment.

1. Precautions

Caution

Altering the settings while carrying out measurements using the equipment may result in incorrect measurements, equipment malfunctions, and damage to peripheral equipment.

Revision History

Date	Manual No.	Revision Reason (Details)
April, 2018	DRW. No. EN294-1799	First edition

Contents

1. Overview

The calibration software transfers commands between TMHSA and a PC and allows users to read TMHSA setting parameter data or write setting parameters as needed.

2. System Operating Requirements

PC	
Operating system	Windows® 7, Windows® 8.0, Windows® 8.1, Windows® 10
CPU	Intel® Pentium® (Dual Core or Single Core) processor Clock speed 2 GHz or higher
Minimum working memory	2 GB or more
Hard disk drive	Free space 1 GB or more
CD-ROM drive	DVD drive also acceptable (Required for setup)
Available USB ports	×1 (Required for USB cable communication)
Minimum resolution	1,280 × 1,024

3. Usage Precautions

Never turn off the TMHSA power or disconnect the USB cable while reading or writing setting parameters to or from the TMHSA.
If this happens, do not leave the system as is after being shut down in the middle of reading or writing; instead, restore the system to normal operation before resuming reading or writing.

4. Initial Setup

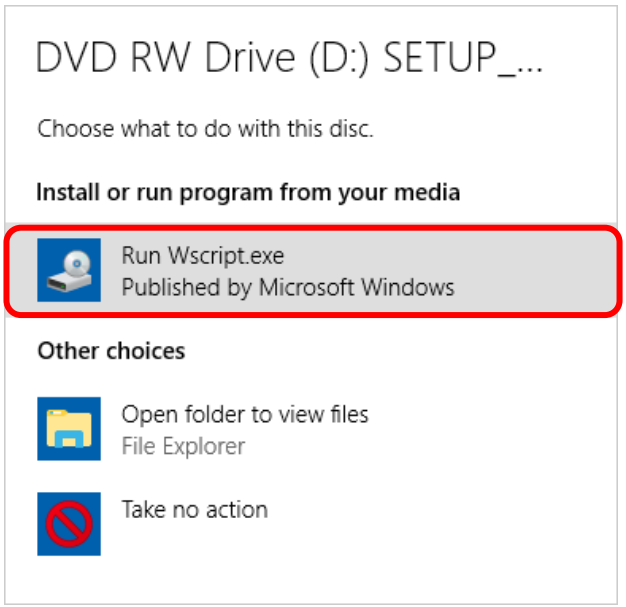
This section describes installation procedures before using the TMHSAD-01 calibration software for the first time.

4-1. Installation

Install TMHSAD-01 on the PC to be used as follows.

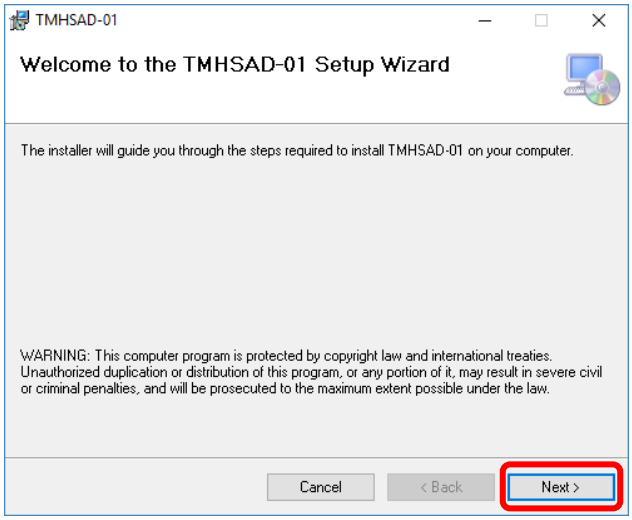
(1) Insert the TMHSAD-01 setup disc (CD-ROM) into the PC.

(2) The [AutoPlay] screen appears.

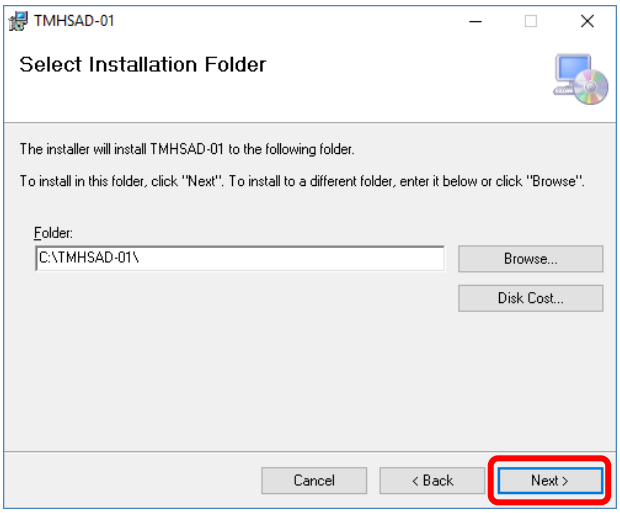


If this does not happen automatically, open the CD-ROM in Windows Explorer or File Explorer and double-click [TMHSAD-01_English.msi] in the [Setup] > [Setup_English] folder.

(3) The [Setup Wizard] screen appears automatically after the [Windows Installer Dialog] is displayed. Click [Next].



(4) Once the [Select Installation Folder] screen appears, specify the folder in which to install the software, and then click [Next].

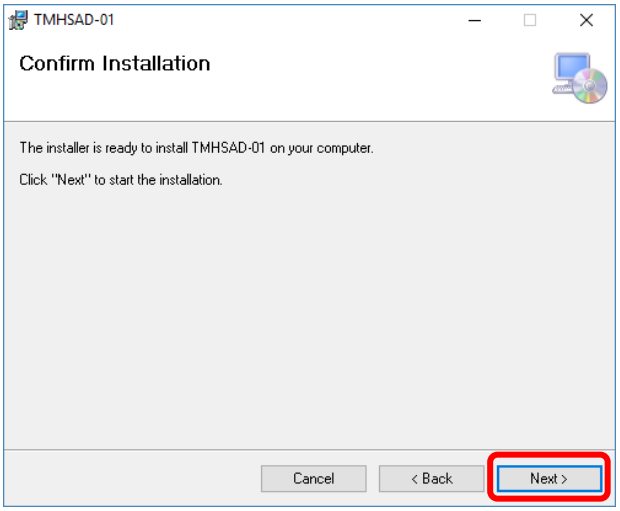


[To change the installation destination folder]

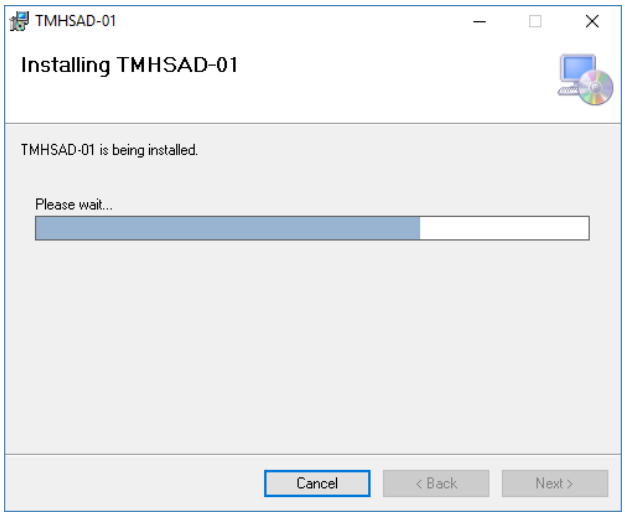
To install to a different location, click [Browse].

Once the [Browse Folder] dialog appears, specify the folder in which to install the software, and then click [OK].

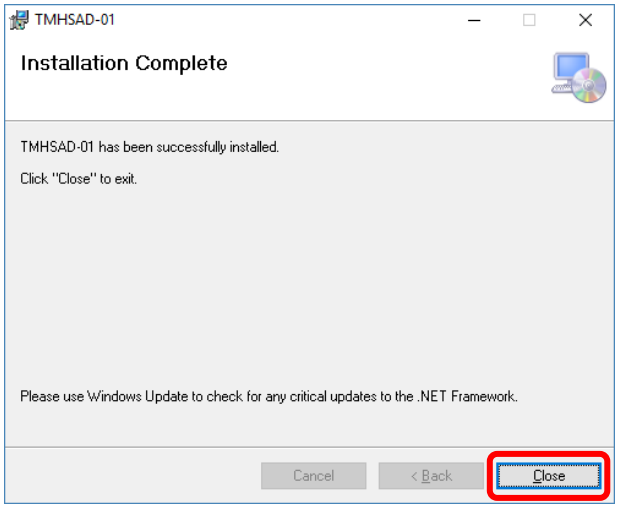
(5) The [Confirm Installation] screen appears.
Click [Next]. Installation starts.



(6) [Installing TMHSAD-01] appears. Wait for installation to be completed.
The screen changes automatically once installation is complete.



(7) [Installation Complete] appears. Click [Close].



4-2. USB Driver Installation

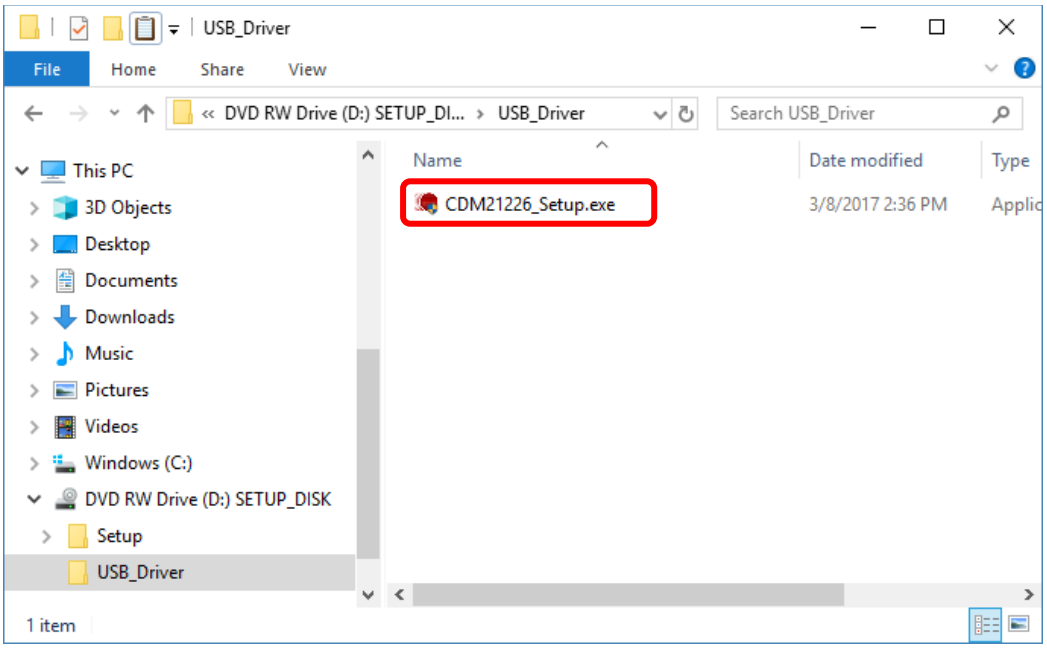
The driver must be installed before the equipment can first be connected to the PC via USB. Install the driver as follows.

The USB drivers are included on the CD-ROM provided.

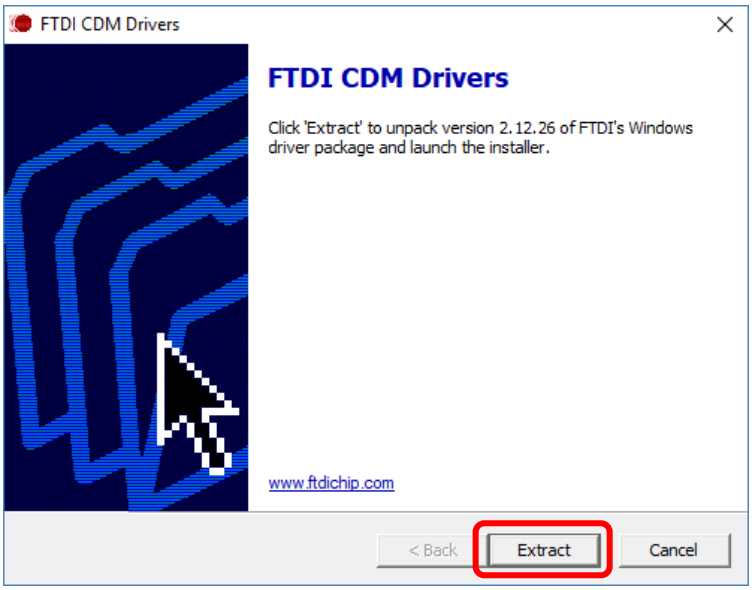
4-2-1. Driver Installation Procedure

(1) Insert the CD-ROM provided in the CD-ROM drive.

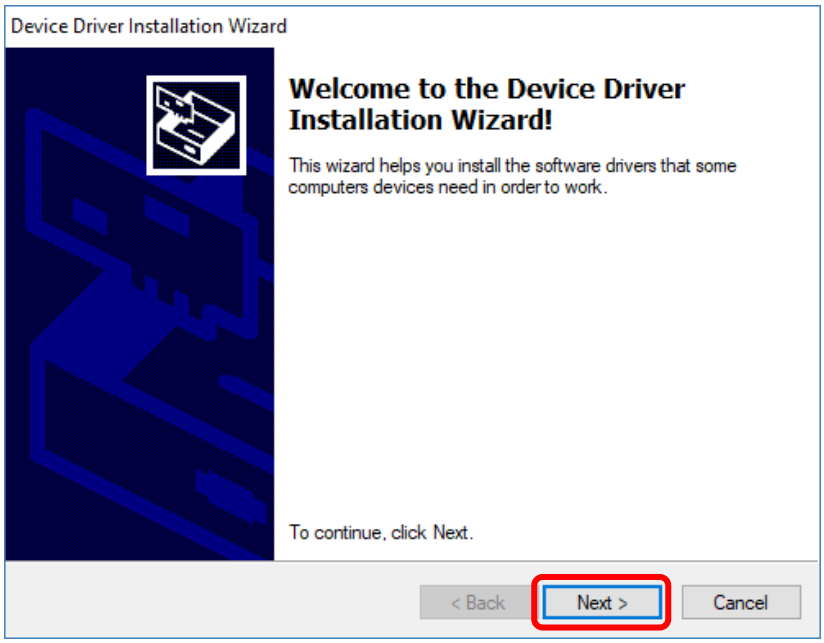
(2) Double-click [¥USB_Driver¥CDM21226_Setup.exe] on the CD-ROM provided to start installation.



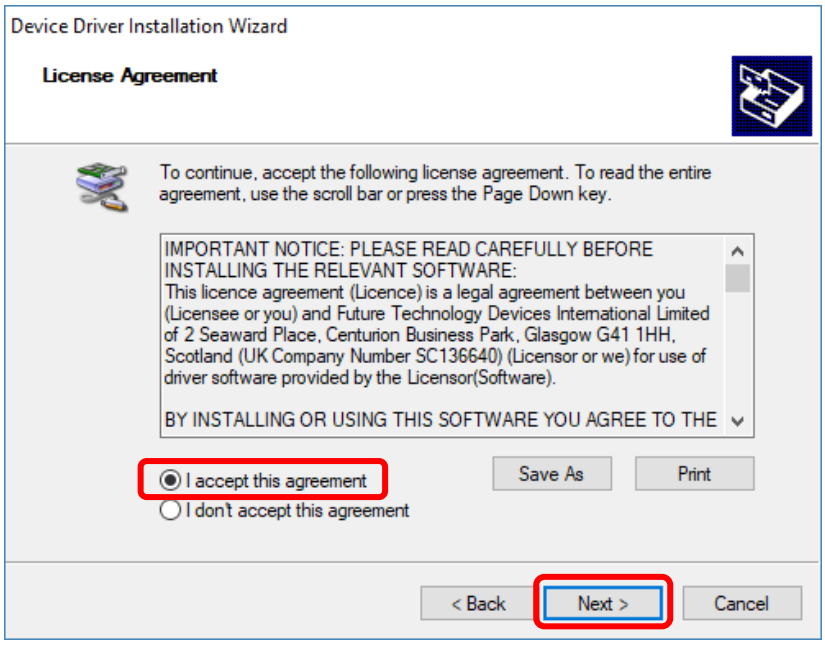
(3) The [FTDI CDM Drivers] screen appears. Click [Extract].



(4) The device driver installation wizard screen appears. Click [Next].

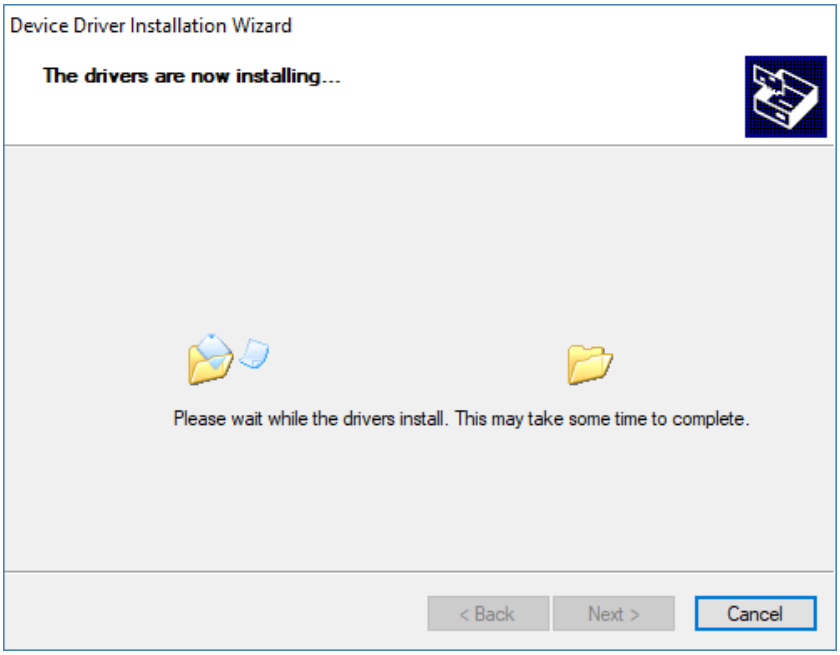


(5) Select to accept the license agreement and click [Next].

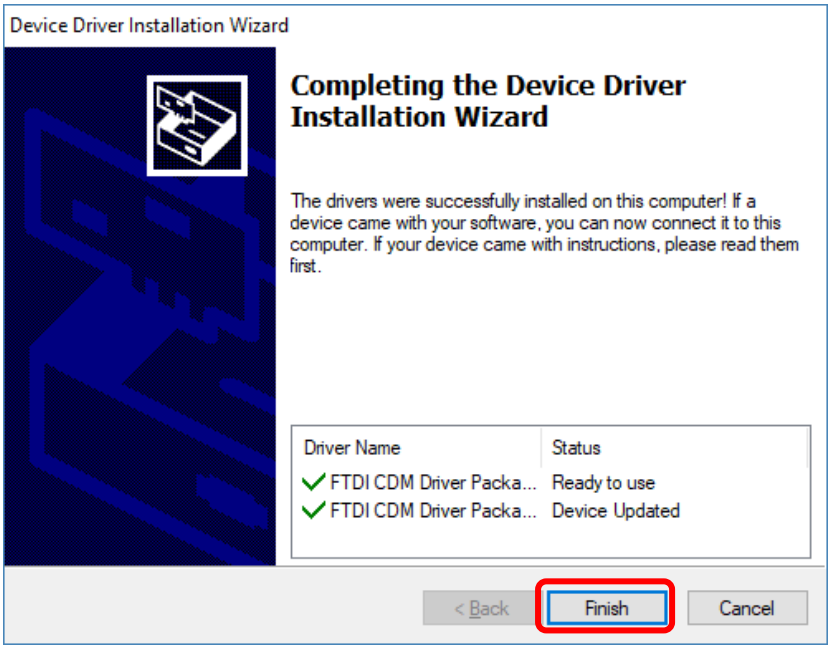


(6) Installation starts. Once installation is complete, the device driver installation wizard complete screen appears. Click [Finish]. Installation ends.

<Screen while installation is in progress>



<Screen when installation ends>



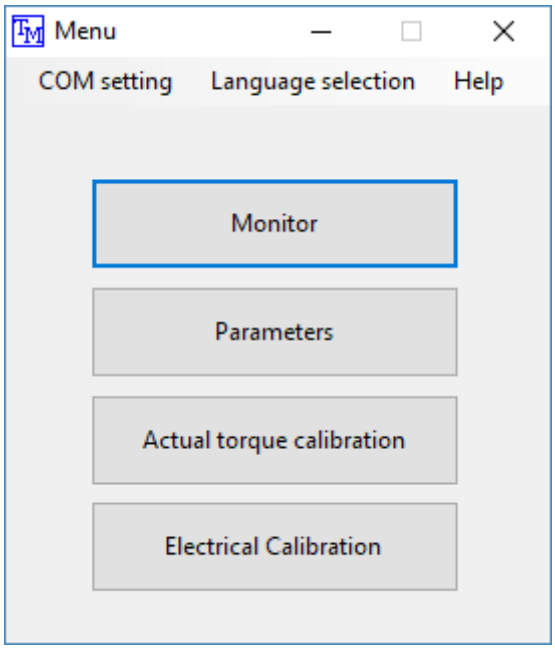
(7) The TMHSA will be recognized automatically when connected to the PC via USB and is ready for use.

5. Launching the Software

The software can be launched using one of the following methods.

- Launch by selecting [Start] → [All Programs] → [MinebeaMitsumi] → [TMHSAD-01].
- Launch by double-clicking the [TMHSAD-01] shortcut created on the desktop.

The following screen appears.



[Explanation of functions]

Name	Description
Monitor	Check the torque AD value and status. For details, see "10. Monitor".
Parameters	Check the version and read/write setting values. For details, see "9. Parameter Settings".
Actual Torque Calibration	Calibrate under conditions of actual torque. For details, see "7. Calibration".
Electrical Calibration	Enter the AD values to perform calibration. For details, see "8. Electrical Calibration”.
Communication settings	Set up communication with the TMHSA. For details, see "6. Communication Settings”.
Language selection	Set up the language in the calibration software. For details, see “11. Language selection”.
Help	Displays the calibration software version.
Quit (x)	Exits the software.

6. Communication Settings

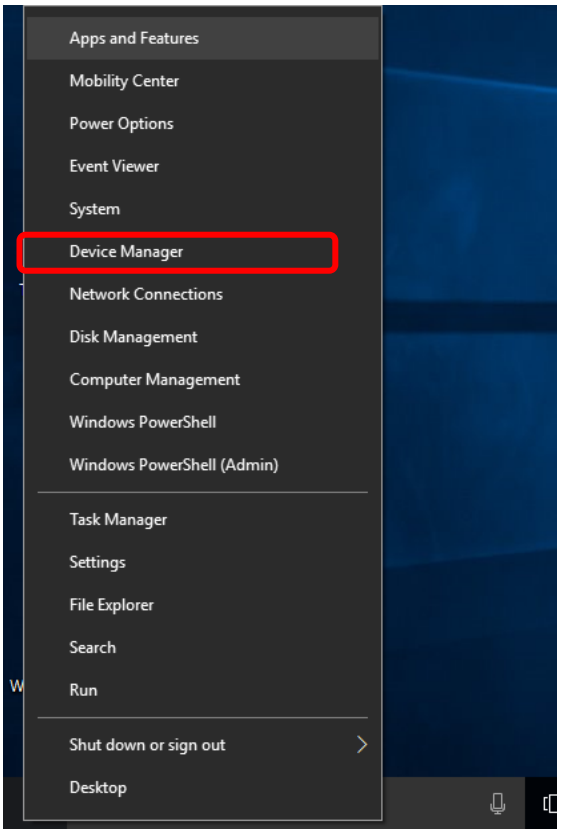
Sets settings used for communication with the TMHSA.

The driver may not be recognized or the COM port number may change if the USB connection location is changed. If a communication error occurs, the COM port number has probably changed. Check the COM port and confirm that it matches the port number in the communication settings.

6-1. Checking the COM Port

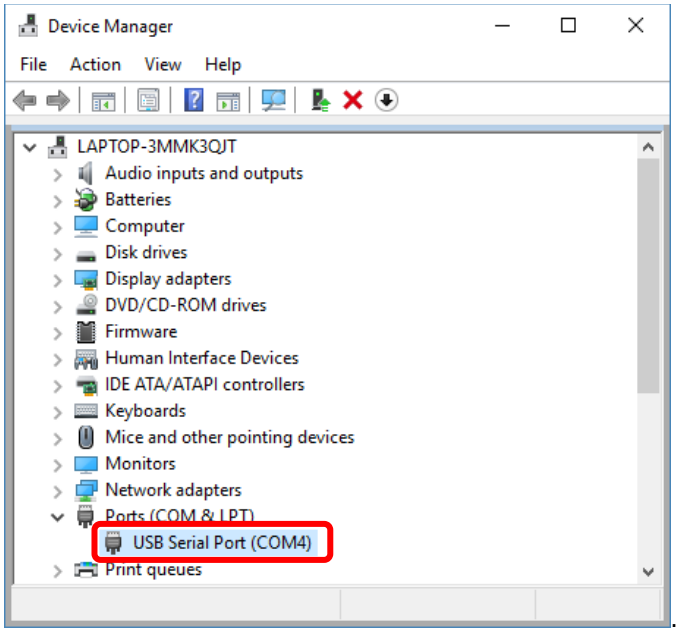
Check the COM port for the TMHSA connection.

(1) Right-click the desktop Start menu, and select [Device Manager] in the displayed menu.



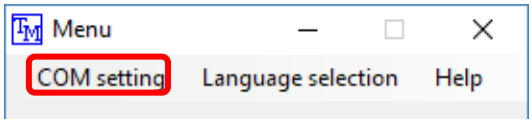
* In case of Windows 7, click the desktop Start menu and right-click [Computer] and select [Management]. Click [Device Manager] in the [Management] menu.

(2) Open [Ports (COM and LPT)] in in Device Manager and check the COM port number.
Example: [COM4] is used in the following case.

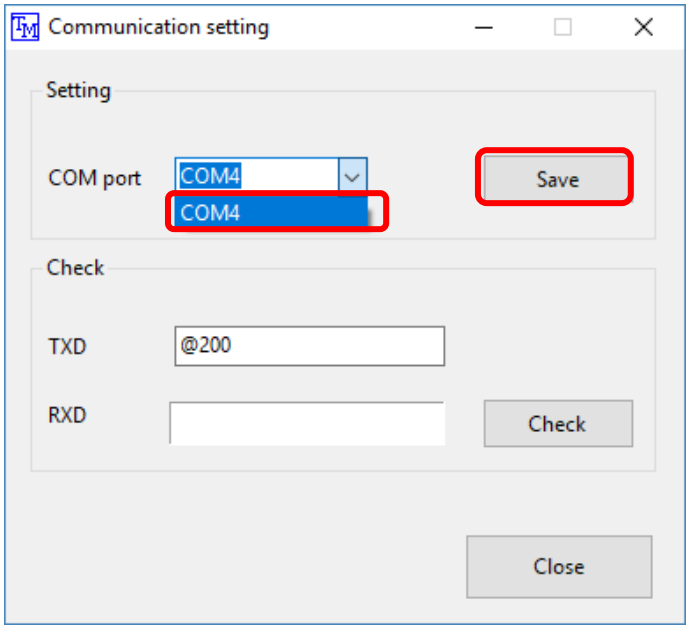


6-2. Setting the COM Port

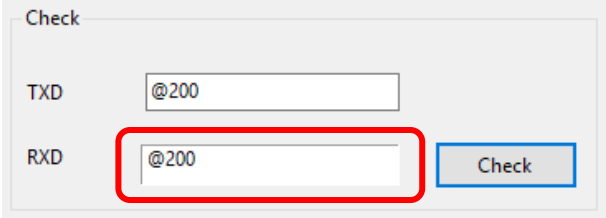
(1) On the menu screen, click [Communication settings].



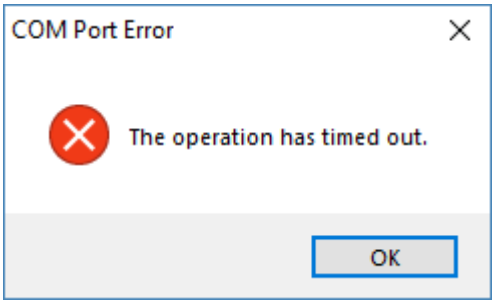
(2) Select the COM port for the TMHSA connection and click [Save].



(3) Click [Check] to confirm normal communication.
Communication is normal if [@200] appears in the RXD box.



The following message box is displayed if communication was not successful.
See the previous instructions and recheck the communication setting details.



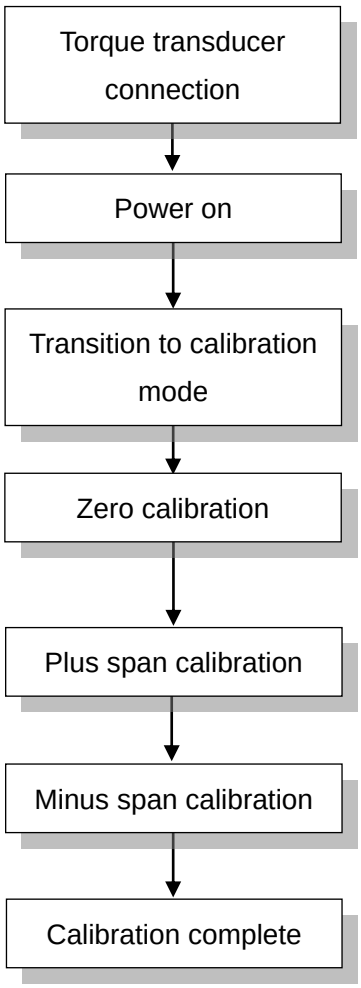
7. Calibration

7-1. What Is Calibration?

Calibration refers to the process of adjusting voltage output to match the torque acting on the torque transducer to ensure that the electrical signal from the torque transducer can be output as an accurate torque value.

For example, this adjustment ensures a voltage output of 10.000 V when a torque of 1,000 N·m acts on the torque transducer.

7-2. Calibration Procedure



Connect the torque transducer to the PC.

Turn on and wait for approximately 10 minutes for the torque transducer and PC to stabilize.

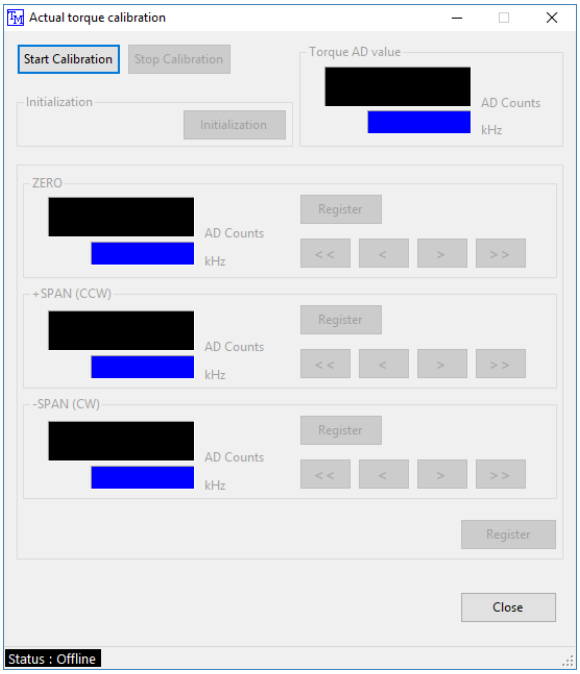
Switch to calibration mode.

Set the torque transducer to the initial torque state and perform zero calibration.

With span torque applied to the torque transducer, register the plus span point.

With minus torque applied to the torque transducer, register the minus span point.

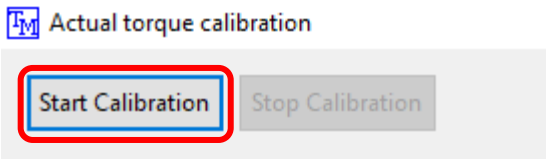
7-3. Screen Description



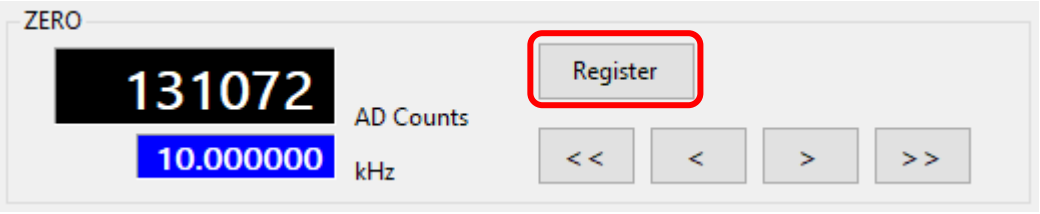
Name	Description
Start Calibration	Starts calibration.
ZERO	
AD Counts	Shows the AD count value with the torque transducer in the initial torque state.
kHz	Shows the frequency conversion value with the torque transducer in the initial torque state.
Register button	Tentatively registers the torque transducer initial torque state.
<<, <, >, >>	Adjust voltage output in the initial torque state.
+SPAN	
AD Counts	Shows the AD count value with the torque transducer in the span torque state.
kHz	Shows the frequency conversion value with the torque transducer in the span torque state.
Register	Tentatively registers the state with span torque applied to the torque transducer.
<<, <, >, >>	Adjust voltage output in the span torque state.
–SPAN	
AD Counts	Shows the AD count value with the torque transducer in the minus torque state.
kHz	Shows the frequency conversion value with the torque transducer in the minus torque state.
Register	Registers the state with minus torque applied to the torque transducer.
<<, <, >, >>	Adjust voltage output in the minus torque state.
Register	Registers calibration.
Stop Calibration	Stops calibration.
Close	Returns to the menu screen.
Status:	Shows the status. Offline: Communication stopped Online: Communication in progress (calibration in progress)
Torque AD Value AD Counts	Shows the current TMHSA internal AD value.
Torque AD Value kHz	Shows the current TMHSA input frequency.

7-4. Calibration Procedure

(1) Step 1: Start calibration
Click [Start Calibration]. Calibration begins.

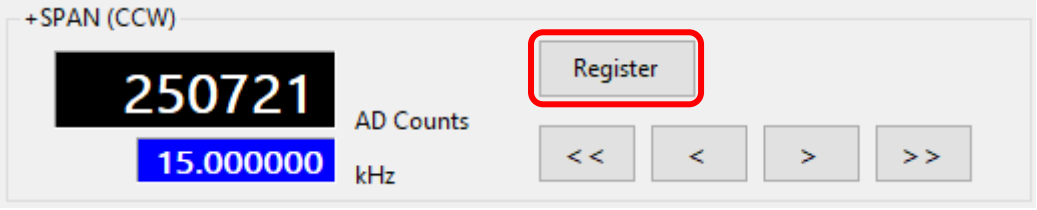


(2) Step 2: Zero calibration
With the torque transducer in the initial torque state, click [Register] in ZERO.
The voltage output becomes approximately 0 V.



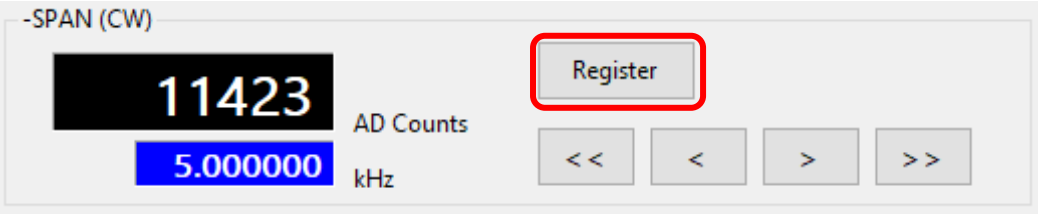
Adjust the voltage output using [<<] (coarse negative adjustment), [<] (fine negative adjustment), [>>] (coarse positive adjustment), and [>] (fine positive adjustment).

(3) Step 3: Plus span calibration
With span torque applied to the torque transducer, click [Register] in +Span.
Voltage output becomes approximately 10 V.



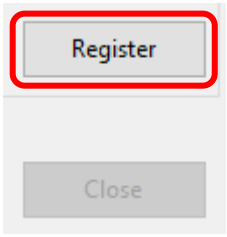
Adjust the voltage output using [<<] (coarse negative adjustment), [<] (fine negative adjustment), [>>] (coarse positive adjustment), and [>] (fine positive adjustment).

(4) Step 4: Minus span calibration
With minus torque applied to the torque transducer, click [Register] in -Span.
Voltage output becomes approximately -10V.



Adjust the voltage output using [<<] (coarse negative adjustment), [<] (fine negative adjustment), [>>] (coarse positive adjustment), and [>] (fine positive adjustment).

(5) Step 5: Registration
Click [Register] to register calibration.



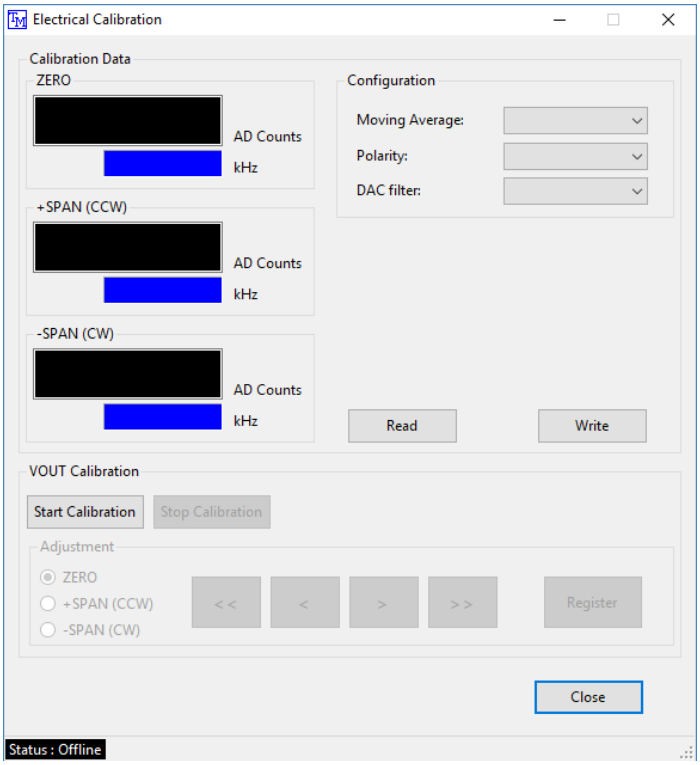
Setting values are only tentatively registered until you click [Register]. Setting values are not saved if you click [Stop Calibration] midway.

8. Electrical Calibration

8-1. What Is Electrical Calibration?

This is the process of applying numerical settings to adjust the voltage output to match the torque acting on the torque transducer when the AD count value for sensor input is known.

8-2. Screen Description

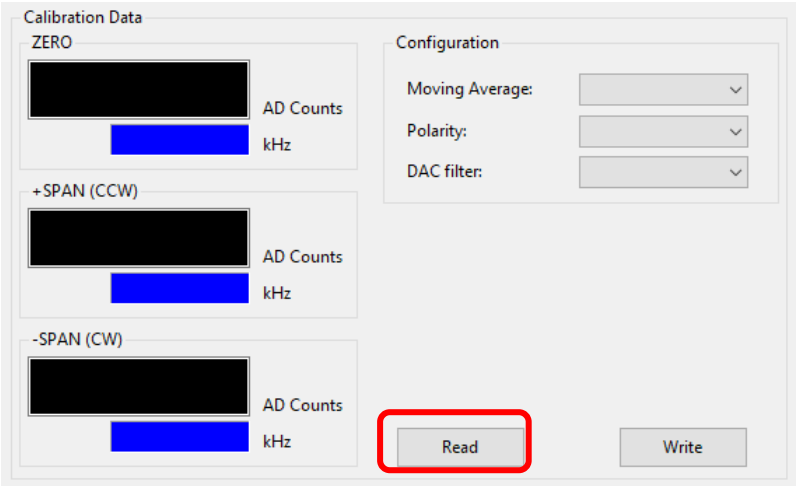


Name	Description
ZERO	
AD Counts	Shows the AD count value with the torque transducer in the initial torque state. Enter a value directly to change the setting value.
kHz	Shows the frequency conversion value with the torque transducer in the initial torque state.
+SPAN	
AD Counts	Shows the AD count value with the torque transducer in the span torque state. Enter a value directly to change the setting value.
kHz	Shows the frequency conversion value with the torque transducer in the span torque state.
–SPAN	
AD Counts	Shows the AD count value with the torque transducer in the minus torque state. Enter a value directly to change the setting value.
kHz	Shows the frequency conversion value with the torque transducer in the minus torque state.
Configuration	
Moving Average	Shows relevant setting information. For setting details, see "9-4. Setting Parameter List”.
Polarity	Shows relevant setting information. For setting details, see "9-4. Setting Parameter List”.

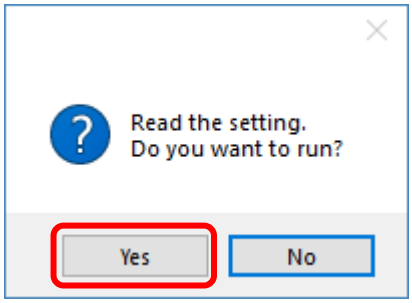
Name	Description
DAC filter	Shows relevant setting information. For setting details, see "9-4. Setting Parameter List."
Read	Reads torque transducer calibration AD count values and configuration information.
Write	Writes torque transducer calibration AD count values and configuration information.
VOUT Calibration	
Start Calibration	Starts voltage output calibration.
Stop Calibration	Stops voltage output calibration.
ZERO	
+SPAN	
-SPAN	
<<, <, >, >>	Adjust voltage output when in the selected state.
Register	Registers calibration.
Close	Returns to the menu screen.
Status:	Shows the status. Offline: Communication stopped Online: Communication in progress (calibration in progress)

8-3. Calibration Procedure

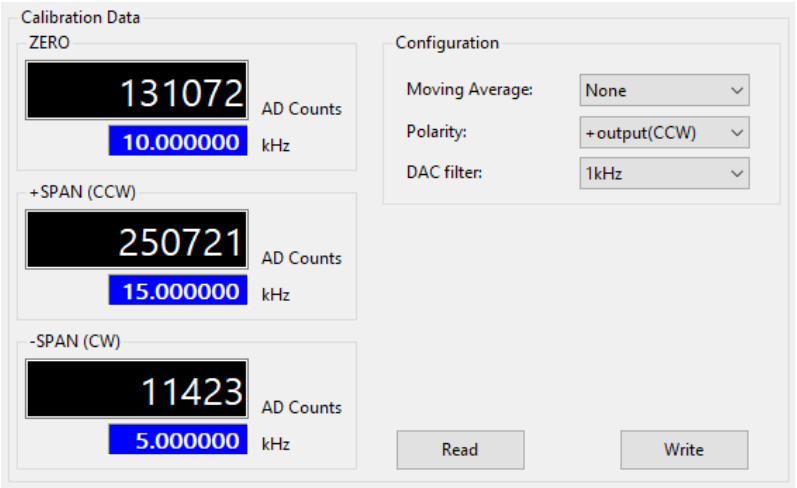
(1) Step 1: Click [Read].



(2) Step 2: The following message appears. Click [Yes].



Calibration data is displayed.



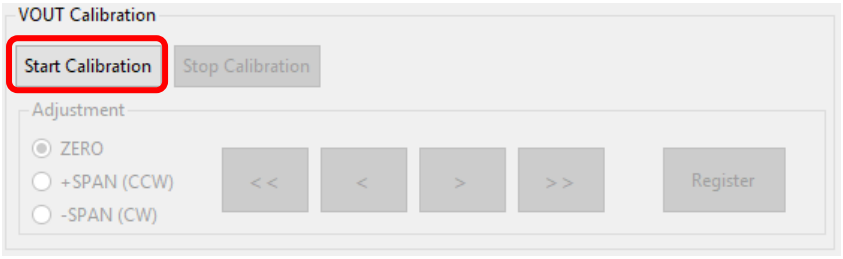
(3) Step 3: Adjust the torque transducer AD count value and Configuration settings as needed.

(4) Step 4: Click [Write].
The torque transducer calibration AD count value and configuration information is written.

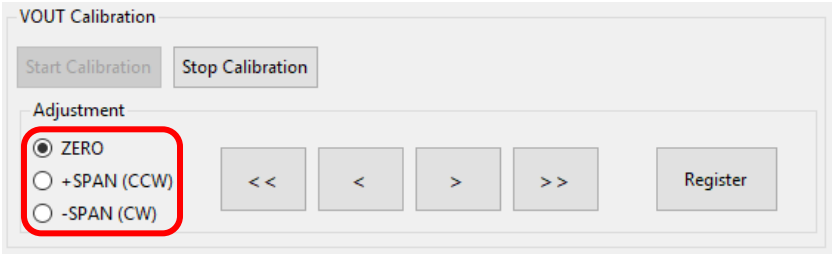
8-4. Adjusting Voltage Output

Adjusts the voltage output without applying an actual torque.

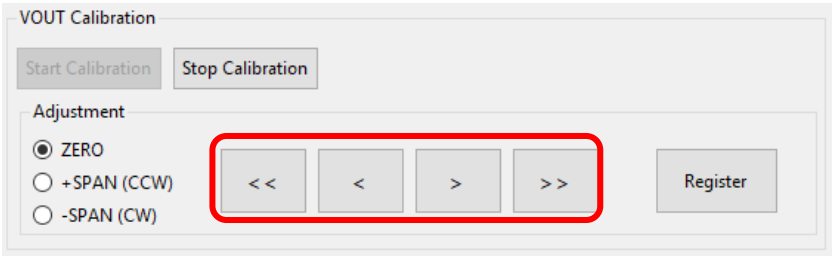
(1) Step 1: Click [Start Calibration]. The process of voltage output adjustment begins.



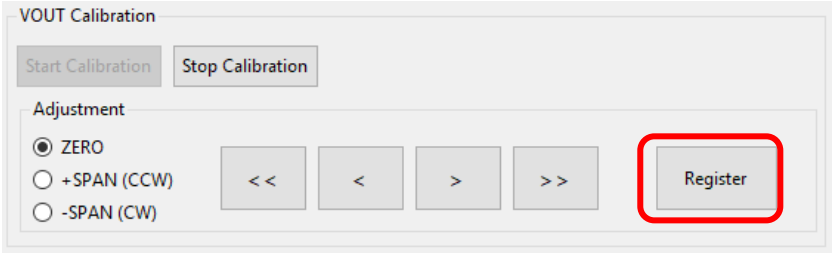
(2) Step 2: Select an item for voltage adjustment: ZERO, +SPAN, or -SPAN.
Voltage is output in the selected state.



(3) Step 3: Use [<<], [<], [>], and [>>] to adjust the voltage of the selected item.



(4) Step 4: After the adjustment, click [Register].

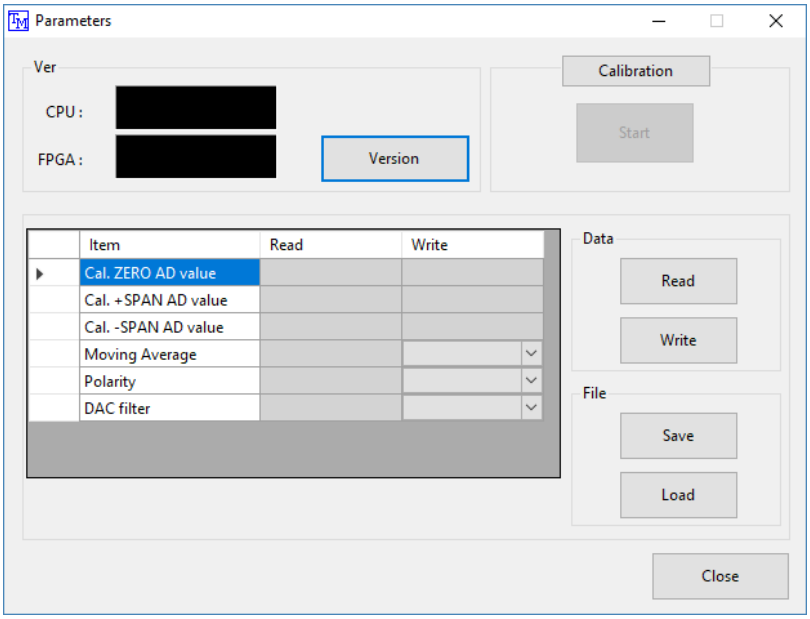


Setting values are only tentatively registered until you click [Register]. Setting values are not saved if you stop midway.

9. Parameter Settings

Check the version and read/write setting values.

9-1. Screen Description



<Information>

Name	Description
CPU	Shows the CPU software version.
FPGA	Shows the FPGA software version.
Version button	Displays the TMHSA version.

<Setting Values>

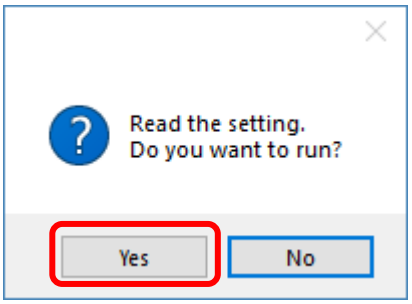
Name	Description
Calibration ZERO AD Value item	Shows relevant setting information.
Calibration +SPAN AD Value item	Shows relevant setting information.
Calibration -SPAN AD Value item	Shows relevant setting information.
Moving Average	Shows relevant setting information.
Polarity item	Shows relevant setting information.
DAC Filter item	Shows relevant setting information.
Read button	Reads information.
Write button	Writes information.
Save button	Saves the information to a CSV file.
Load button	Loads data saved as a CSV file.
Close Button	Returns to the menu screen.

9-2. Reading Setting Parameters

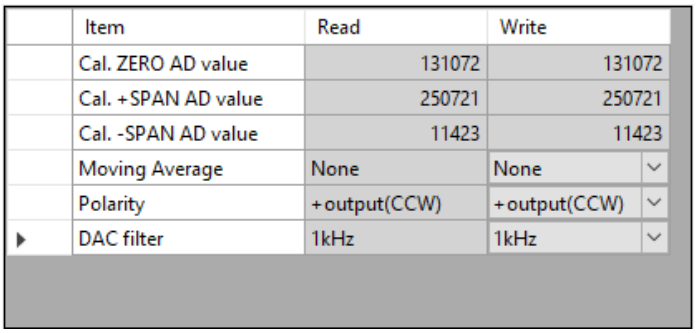
This section describes the procedure for reading TMHSA setting parameters.

(1) Click [Read] on the screen.

(2) Click [Yes] in the message box.



(3) The TMHSA setting parameters are displayed.



	Item	Read	Write
	Cal. ZERO AD value	131072	131072
	Cal. +SPAN AD value	250721	250721
	Cal. -SPAN AD value	11423	11423
	Moving Average	None	None
	Polarity	+output(CCW)	+output(CCW)
▶	DAC filter	1kHz	1kHz

9-3. Writing Setting Parameters

This section describes the procedure for writing TMHSA setting parameters.

(1) Follow the procedures in "9-2. Reading Setting Parameters" to read all setting parameters from the TMHSA at once.

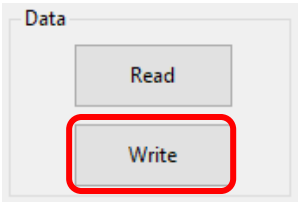
(2) The TMHSA setting parameters are displayed in [Read] and [Write]. Enter a [Write] value as desired for the setting parameter to change.

For details of the input ranges and selection items for each item, see "9-4. Setting Parameter List."

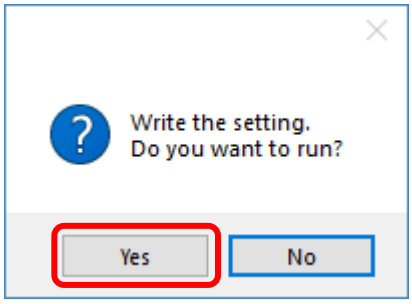
	Item	Read	Write
	Cal. ZERO AD value	131072	131072
	Cal. +SPAN AD value	250721	250721
	Cal. -SPAN AD value	11423	11423
	Moving Average	None	None
	Polarity	+output(CCW)	+output(CCW)
▶	DAC filter	1kHz	1kHz

The cells for items for which overwriting is prohibited are grayed out (input and selection disabled).

(3) Click [Write] on the screen.



(4) Click [Yes] in the message box.
The information is written.



9-4. Setting Parameter List

Item	Setting value	Details
Calibration ZERO AD Value	0–262143	Calibration zero AD count value
Calibration +SPAN AD Value	0–262143	Calibration plus span AD count value
Calibration -SPAN AD Value	0–262143	Calibration minus span AD count value
Moving Average	● None	
	2 times	
	4 times	
	8 times	
	16 times	
	32 times	
	64 times	
	128 times	
	256 times	
	512 times	
Polarity	● + output (CCW) - output (CW)	Counterclockwise plus voltage output
		Clockwise plus voltage output
DAC Filter	●1 kHz	
	500 Hz	
	300 Hz	
	100 Hz	
	50 Hz	
	30 Hz	
	10 Hz	
	1 Hz	

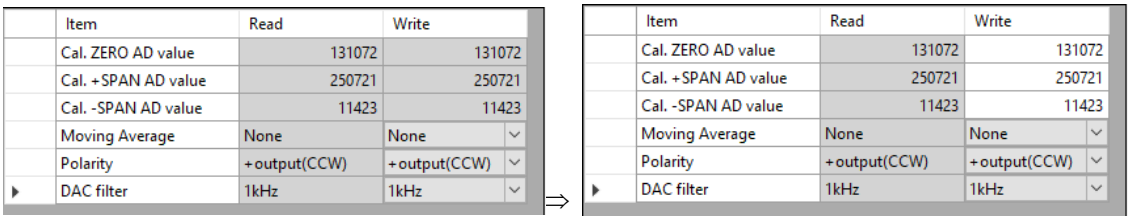
"●" indicates default settings.

9-5. Writing Calibration Data

Calibration ZERO, +SPAN, and -SPAN AD values can be adjusted.

(1) Click [Calibration]. The button changes to [Editing].

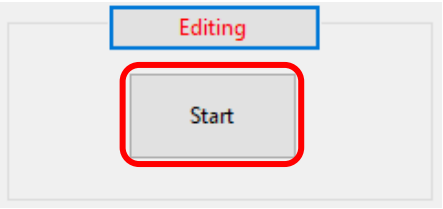
Calibration items can be set in this Editing mode.



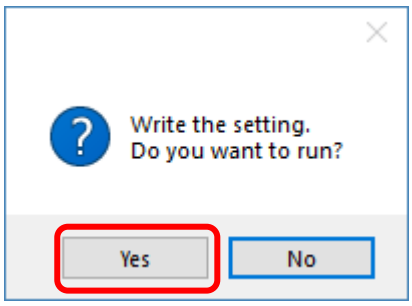
Item	Read	Write
Cal. ZERO AD value	131072	131072
Cal. +SPAN AD value	250721	250721
Cal. -SPAN AD value	11423	11423
Moving Average	None	None
Polarity	+output(CCW)	+output(CCW)
DAC filter	1kHz	1kHz

(2) Adjust the values of the calibration items to set.

(3) Click [Start] after changing calibration items.



(4) The following message appears. Click [Yes].
Calibration item writing is complete.

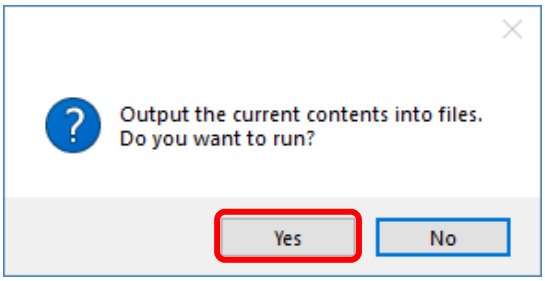


9-6. Saving Files

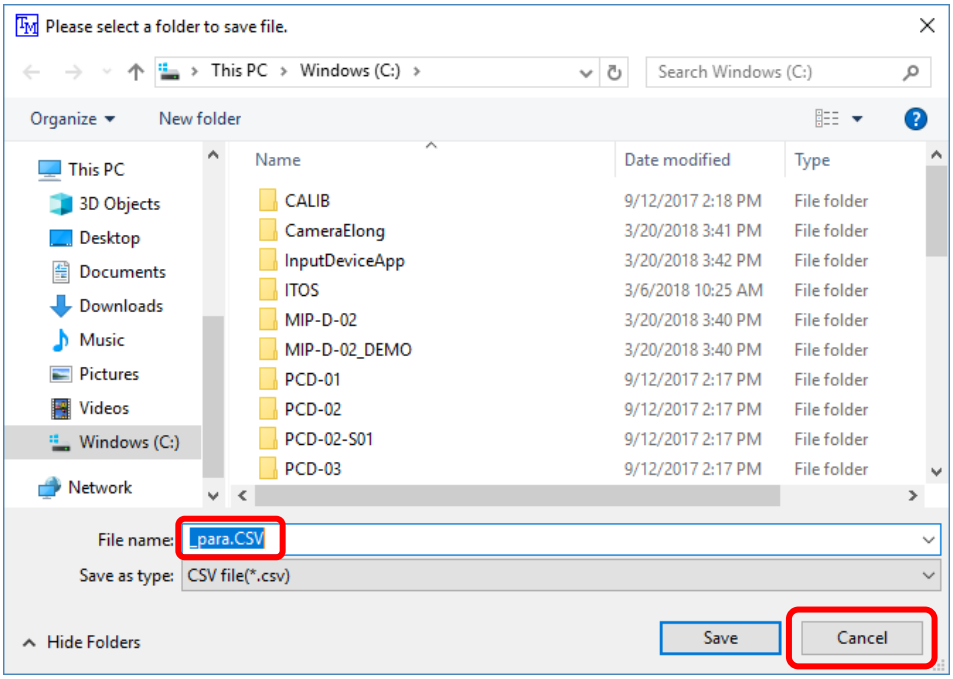
You can save setting items to a file in CSV format.

(1) Click [Save].

(2) The following message appears. Click [Yes].
Calibration item writing is complete.



(3) The [Please select a folder to save file.] dialog is displayed.
Specify the save destination and file name and save the results.



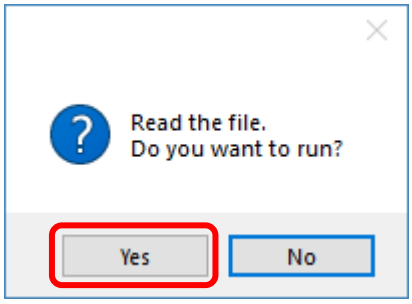
If [Cancel] is clicked, data will not be saved.

9-7. Loading Files

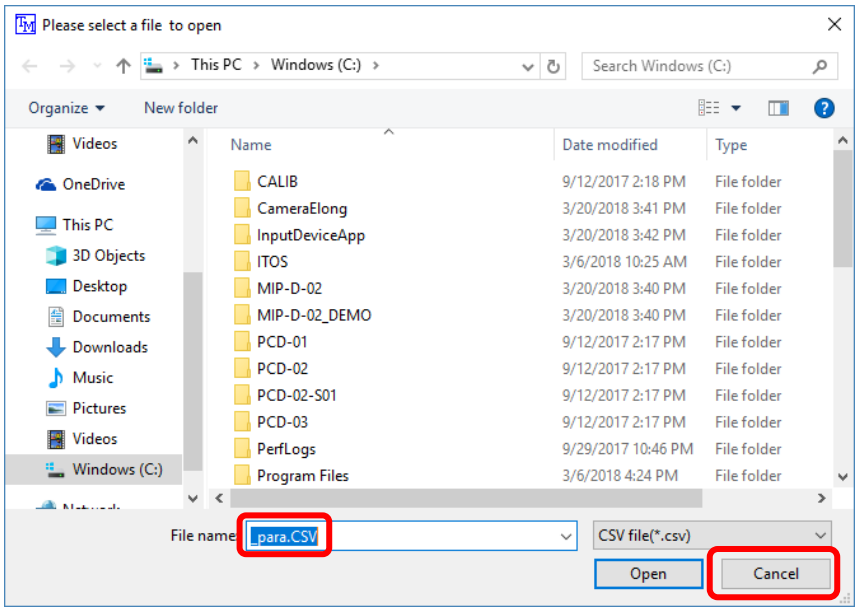
You can load setting items saved as a CSV file.

(1) Click [Load].

(2) The following message appears. Click [Yes].
Calibration item loading is complete.



(3) A dialog is displayed to select a file to open.
Specify where to load the file from and the file name and click [Open].



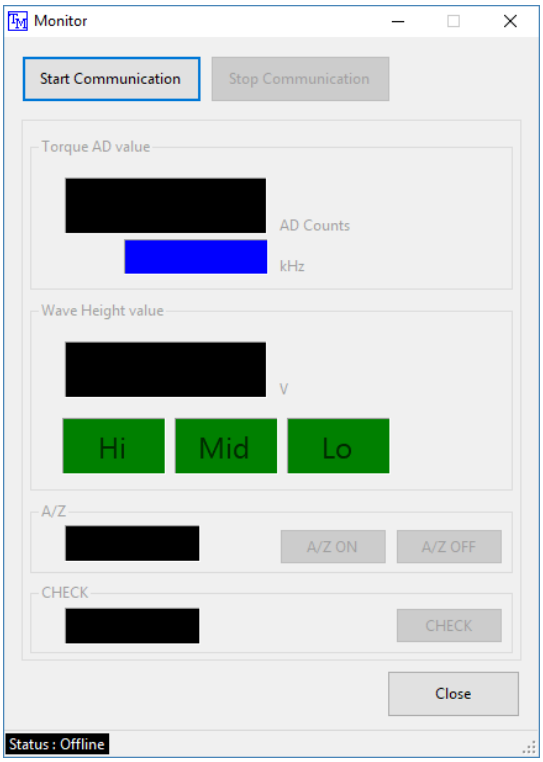
(4) Values loaded from the file are shown in the [Write] items.

	Item	Read	Write
	Cal. ZERO AD value	131072	131072
	Cal. +SPAN AD value	250721	250721
	Cal. -SPAN AD value	11423	11423
	Moving Average	None	None
	Polarity	+output(CCW)	+output(CCW)
▶	DAC filter	1kHz	1kHz

10. Monitor

Check the torque AD value and status.

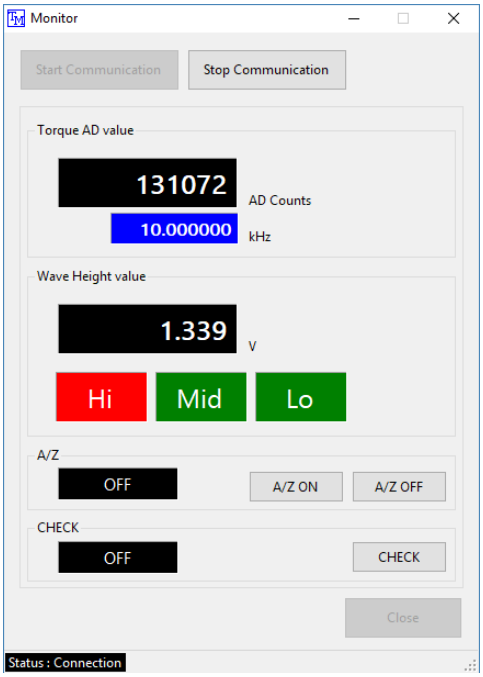
10-1. Screen Description



Name	Description
Start Communication	Starts communication with the TMHSA and displays on the monitor.
Stop Communication	Stops communication with the TMHSA.
Torque AD Value	
AD Counts	Shows the torque AD value.
kHz	Shows the input frequency.
Wave Height value	
Voltage value display (V)	Shows the wave height voltage value.
Hi wave height value	Red when the wave height is high
Mid wave height value	Red when the wave height is moderate
Lo wave height value	Red when the wave height is low
A/Z	
Status display	Shows the A/Z status.
A/Z ON button	Activates A/Z.
A/Z OFF button	Deactivates A/Z.
CHECK	
Status display	Shows the check status.
CHECK button	Switches between checking on/off.
Close	Returns to the menu screen. Enabled only when communication has stopped
Status:	Shows the status. Offline: Communication stopped Connection: Communication in progress

10-2. Start Communication

Starts communication with the TMHSA and displays on the monitor.



10-3. Stop Communication

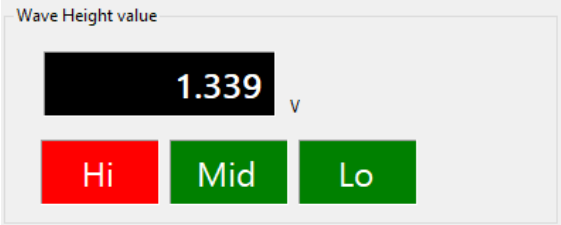
Stops communication with the TMHSA.

10-4. Torque AD Value

Shows the torque AD count value and the corresponding value converted to frequency.

10-5. Wave Height value

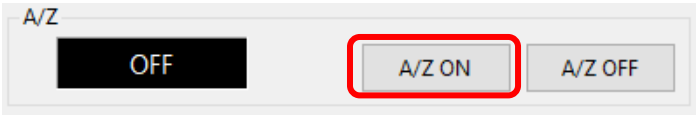
Shows the voltage value and status of the torque meter light level.



Screen	Details
Hi Mid Lo	Normal torque meter light level
Hi Mid Lo	Low torque meter light level
Hi Mid Lo	The torque meter light level is too low to guarantee torque measurements.

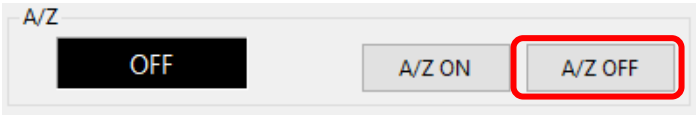
10-6. A/Z

Click [A/Z ON] to activate A/Z.



ON status: 

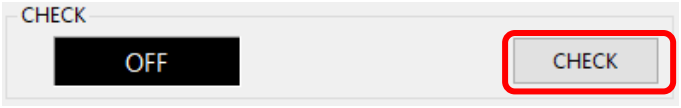
Click [A/Z OFF] to deactivate A/Z.



OFF status: 

10-7. CHECK

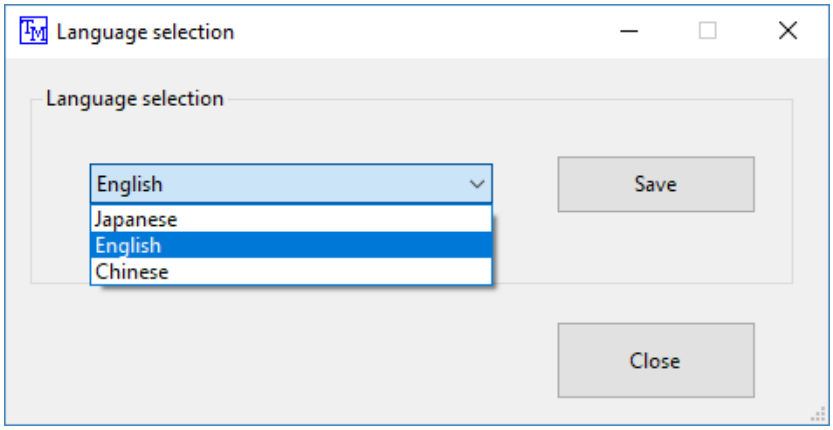
Click [CHECK] to switch between checking on/off.
Outputs approximately 8.0 V of analog voltage.



ON status: 

OFF status: 

11. Language selection

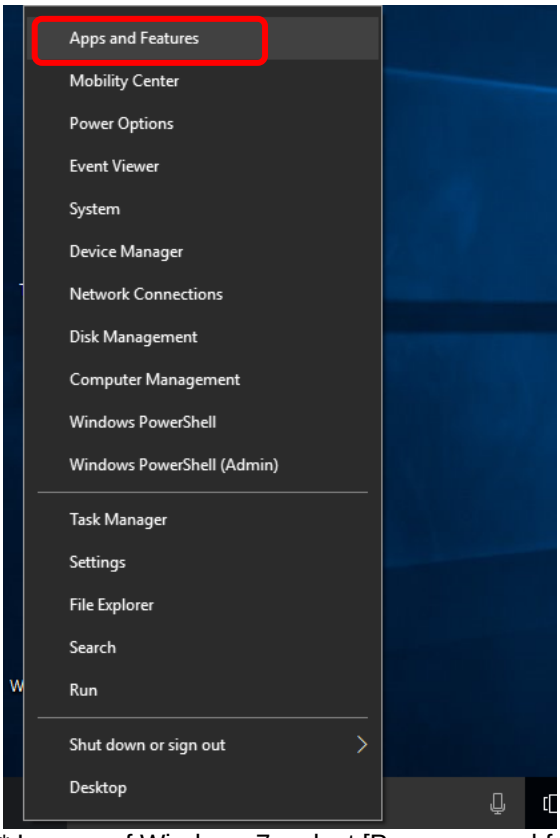


Description	Details
Save	Fix and save the contents of language selection. To apply the setting of language selection, please quit the calibration software and start it again.
Close	Returns to the menu screen. If you do not save the settings, the change of language selection will not be effective.

12. Uninstalling

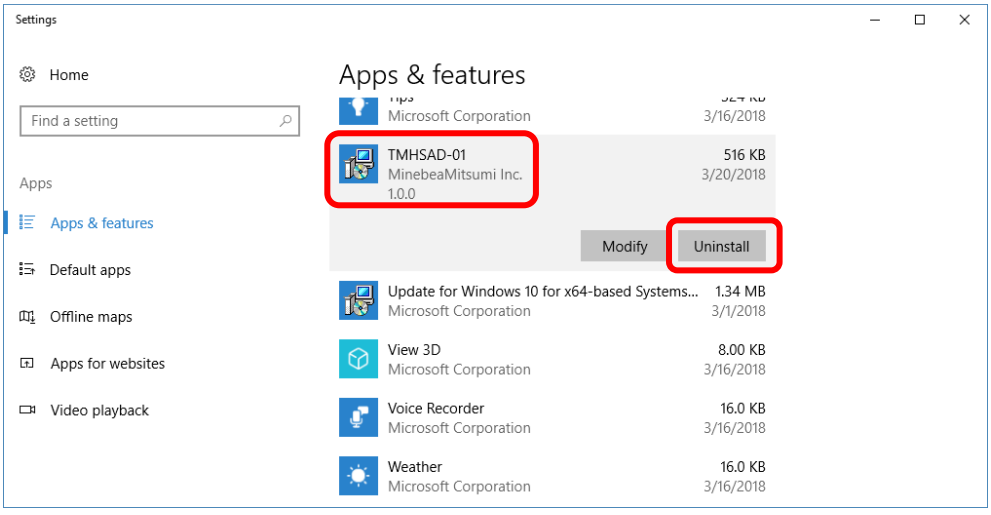
Do the following to uninstall (remove) the software.

(1) Right-click the desktop Start menu, and select [Apps and features] in the displayed menu.

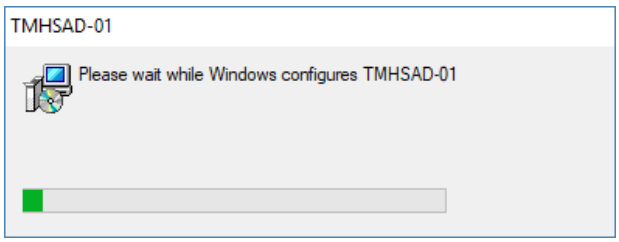


* In case of Windows 7, select [Programs and functions] in the [Control panel].

(2) Select [TMHSAD-01] and run [Uninstall].



(3) Uninstalling is complete once the window below disappears.



●The contents of this manual may subject to change without notice.

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